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East Europe Report

SCIENTIFIC AFFAIRS

No. 675



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BRIEFS

CSSR-USSR COMPUTER COOPERATION--As reported by the current Prague director of the Technical Center of the Soviet enterprise Elektronorgtekhnik Igor Arkadiyevich Polyushkin, the Center has been operating in the CSSR for a number of years. Elektronorgtekhnik has a monopoly on exports and imports of CEMA's Joint Electronic Computer System (JSEP) computers and Minicomputer System (SM) computers. Currently 150 JSEP computers are operating in the CSSR, involved in a wide spectrum of scientific, technical, economic and administrative tasks. Also operational are 124 SM minicomputer units used in management and control of technological and production processes. JSEP and SM computer technology exports from the USSR to Czechoslovakia amount to a yearly sum of about 40 million rubles. During the Seventh Five-Year Plan these exports will amount to about 223 million rubles and exports of computer technology from the CSSR to the USSR to about 400 million rubles. Besides its consultative function, the Technical Center can perform repairs and service on units still under warranty within 48-72 hours, and within 5-7 days on units with expired warranty. Roughly 3,000 Czechoslovak computer experts have been trained at Soviet computer production facilities in the USSR and other 300 Czechoslovak specialists by visiting Soviet computer experts in the CSSR. About 250 Soviet experts travel to the CSSR yearly to set up and service the computers. The Technical Center's modern mobile laboratory does repairs in the field. The most advanced computer produced within CEMA, the SEP EC 1045 is currently undergoing tests in the USSR. This model is comparable to the U.S.-produced IBM model 370/148 computer. [Prague MLADA FRONTA in Czech 14 May 80 p 2]

CSO: 2402

ALBANIA

BRIEFS

FIRST REPLACEMENT OF HEART VALVE--[Editorial Report] Tirana ZERI I POPULLIT in Albanian 17 April 1980 p 3 reports that a medical team of cardiologists, headed by Professor Petrit Gacja, operated on a 31-year-old man to replace a heart valve with an artificial valve of pyrolytic carbon. The operation, which took place in the cardiology clinic of Hospital No 2 in Tirana on 28 February 1980, was successful; and the first of its kind in Albania. So far, about 400 heart operations have been performed in the country. According to Prof Gacja, in the 1960's only one heart operation a week was performed and now two or three a day are performed and measures have been taken to perform the heart valve replacement operation two or three times a week.

CSO: 2102

CZECHOSLOVAKIA

BRIEFS

LASER ACUPUNCTURE--Dr Radomír Ruzicka, the chief resident doctor at the Railroad Hospital and Polyclinic in Olomouc has performed about 12,000 acupunctures and tested acupuncture using laser beams on about 2000 patients. The laser acupuncture results have been highly successful, curing migraine as well as other headaches, bronchial asthma, perceptual loss of hearing, tympanophonia, stomach and duodenal ulcers, rheumatic problems of the spine and joints, and so forth. According to Dr Ruzicka application of the laser beam in acupuncture has several advantages compared to the use of needles in traditional acupuncture, causing no bleeding, infection or wounds, and using only a fraction of time needed using the needles. [Prague SVOBODNE SLOVO in Czech 9 May 80 p 10]

ANTICORROSIVE PAPER--Prague Paper Works have developed several new types of anticorrosive paper used for protection of engineering industry products. Three newly-developed and proven types of this paper are called Svik, Poltkor and Mikrotex. Currently 25 percent of engineering industry products are packaged with paper and cardboard. [Prague LIDOVA DEMOKRACIE in Czech 20 May 80 p 6]

TEST CALF DIES--The artificial heart implantation experiment with the test calf Hasan has ended after 150 days, at the KUNZ (Regional Institute of Public Health) scientific center in Brno. Czechoslovakia thus gained a third place worldwide in the length of an experiment involving an animal implanted with an artificial heart. [Prague PRACE in Czech 20 May 80 p 3]

CSO: 2402

PROGRESS IN MICROSURGERY TECHNIQUES DESCRIBED

Leipzig LEIPZIGER VOLKZEITUNG in German 16-17 Feb 80 p 10

[Article by Peter Liebers: "Mini-Operations Using 'Invisible' Instruments--New Possibilities of Microsurgery Techniques"]

[Text] The monitor shows a section of the surgical area. With scalpel and forceps blood vessels and nerves are dissected out, removed and separated. At first glance, it is work that is carried out daily in hundreds of operating rooms. A second look sets us straight. The instruments are as fine as hair and almost invisible without a microscope. The "patient," a white rat in general anaesthesia, has had a piece of skin measuring barely 1 square centimeter removed from its groin. There is a narrow stalk on it for maintaining the necessary vessels and nerves which will immediately be joined with one another.

We are witnessing a model experiment in the use of microsurgical technique developed by the Plastic Surgery Clinic of Friedrich Schiller University in Jena. A small collective, gathered around Meritorious People's Physician, Clinic Director Prof Dr Harry Heiner, is carrying out pioneering work for the socialist countries in this new branch of surgery which, since its development, primarily in Australia, Japan and Canada, in the 1960's, has opened up completely new medical possibilities. "With the help of microsurgery," Professor Heiner says, "whole limbs severed in accidents can be rejoined or even large internal organ defects can be closed relatively quickly and safely by microsurgical lobe transplantation. Microsurgery holds great importance for all surgical disciplines but, because of the high expenditure for instruments, it requires close collaboration."

For this reason a microsurgical study group was established last year at Jena University, where all specialties from neurosurgery to gynecology to orthopedics were represented. The aim was to make this new technology rapidly available to large numbers of physicians and to work out possible operational areas as well as to utilize collectively the expensive equipment and instruments.

"The animal model experimentation developed in Jena is particularly suited for training in this complicated technique," stressed Prof Dr Boleslaw Nagay of the Surgical Clinic of the Medical Academy in Szczecin. He was among the participants of the second microsurgical training course in Jena, attended by medical people from Poland, the USSR, Hungary and the GDR.

Clinicians in Friedrich Schiller University collaborated with VEB Carl Zeiss, Jena, in the installation of 16 of the expensive microsurgical work areas. Professor Heiner, initiator of the courses of instruction, considers them a favorable base for an international exchange of knowledge for the expansion of mutual research.

First steps in that direction have already been taken with partners from the Soviet Union. In Jena, in December, Prof Dr Viktor Krylov of the All-Union Research Institute for Clinical and Experimental Surgery of the USSR Health Ministry accordingly signed a cooperative agreement. Among other things, it provides for the exchange of specialists and scientific papers as well as for the division of research work according to a cooperative program. While Soviet surgeons are getting training through the Jena program and model experimentation--the latter has meanwhile also aroused the interest of the medical people from the countries where microsurgery originated--Zeiss scientists use Soviet suggestions for further development of operational microscopy.

In the Jena clinic, where microsurgery has been transferred from animal experiment to clinical practice within 2 years, this operating technique has been utilized in more than 10 operations. Presently, there is intensive work on the further development and improvement of microsurgery technique in Jena and in the Soviet partner clinic in Moscow directed by Prof Boris Petrovskiy, health minister and Academy member. Their aim is the microsurgical transplantation of different tissues.

The doctors explain the above as transplanting tissue pieces that have been completely separated from the body to other parts. At present, additional complicated operations in several steps are moreover required. If, for example, skin from the abdomen is to be transplanted to an injured area of the arm, the arm with the partially transplanted skin must be immobilized against the body for a long time. Only when the skin is grown to the arm and nourished by it can it finally be separated from the abdomen. Not only is this procedure frequently a real hardship for the patient but it also considerably restricts transplantation possibilities. The increasing number of sensational reports of rejoining fingers or arms severed in accidents heard around the world indicate that microsurgical techniques have created the necessary preconditions.

9518

CSO: 2302

STUDY SHOWS ACUPUNCTURE EFFECTIVE IN CERTAIN TYPES OF TREATMENT

East Berlin * RLINER ZEITUNG in German 22-23 Mar 80 p 13

[Text] Acupuncture may provide help for a good number of patients with functional complaints who do not respond to conventional treatment. This statement was made by scientists of the eye clinic of Karl Marx University, Leipzig, in a report in the journal MEDIZIN AKTUELL. The scientists emphasize the value of this controversial form of therapy in cases where treatment with needles takes place under medical supervision.

The experts point out: "Even opponents of acupuncture do not dispute these successes. In this discussion, many doctors proceed on the principle that anything that can possibly remove or diminish without risk the aches and complaints of patients should have a place in the practice of medicine regardless of which form of therapy it involves."

For the past 8 years the eye clinic of Karl Marx University, Leipzig, has been applying acupuncture, but only to patients suffering from severe headaches. Only such patients were selected who for a long time, often for years, had been treated unsuccessfully by other specialists and whose general condition and professional life as well as their family relationships had been considerably disturbed. This included patients with migraine and other headaches, trigeminal neuralgia and blepharospasm (spasmodic winking). More than half of those treated experienced a lasting improvement. Ten to 20 percent of the patients showed no effect. Quite a few required repeated treatment up to four times. The majority of the patients required 4-10 sessions with 10-15 acupuncture needles inserted at each session. The scientists, nevertheless, emphasize: "If one considers that with few exceptions severe cases of disease are dealt with then the results are astounding." The absence of a generally accepted scientific explanation for the effect of acupuncture is of little importance, according to the scientists.

They moreover point out that misunderstandings often arise because the "essence" of acupuncture comes from a basis other than that of many trends of modern medicine. Acupuncture teaching is reportedly inductive-synthetic, setting everything in a relationship to each other, tending toward empiricism. Modern medicine is essentially analytic, questions relentlessly the why of an effect and concentrates on individual symptoms. Nevertheless, it is still remarkable that a science of medicine formulated 5,000 years ago

perceived, for example, the antagonistically stimulating effect of the sympathetic and parasympathetic in Yin and Yang at a time when in the occident medical science was dominated by sacral elements or even by the scurrilous teachings of antiquity, of the Middle Ages and also partly of early modern times.

In the discussion of the value or lack of value of acupuncture many opponents proceed from the current state of science. They obviously cannot imagine that there may be phenomena involved in the healing process which cannot be ascertained with present methods (for example, microscopes, microelectrodes, biochemistry and many others). Inasmuch as the effectiveness of acupuncture can be investigated, more convincing data may be obtained from such patients who have been treated for years by other methods without success.

The authors emphasize that for practicing physicians the advantage of acupuncture is the extraordinarily good ratio of result, risk and cost. Even a success rate of 5-10 percent in diseases which have resisted all other treatments is still remarkable.

9518

CSO: 2302

EXPERIMENTAL, PRODUCTION OF INDUSTRIAL ROBOTS

Budapest FINOMMECHANIKA MIKROTECHNIKA in Hungarian No 3, Mar 80 pp 65-73

[Excerpts] It appears that industrial robots are the devices which will make it possible to deal with the movement and handling of work pieces produced in small or medium series by numerically controlled machines in harmony with the overall automation of such processes.

Unfortunately the cost of investments--price and wages--in Hungary are not as favorable in Hungary as in Japan. Perhaps this is one reason that we are unable, as yet, to speak of industrial robots operating on a regular production basis. However, plans are in the works, and industrial robots will be part of Hungary's integrated manufacturing system.

Analyses conducted in the GDR have revealed that use of robots in assembling depends chiefly on two parameters: number of pieces to be assembled and the size of the parts. According to GDR specialists, series ranging from 10-100,000 units per year and sizes from 10 - 10,000 mm encompass the range within which industrial robots can be used efficiently.

The development of automated manufacturing cells for various tasks is in progress at the IKARUSZ Factory. A comprehensive report on these was presented in Szeged in June 1979 at the Industrial Robot Colloquium II. It was established that point-controlled industrial robots having a number 5 degree of freedom suffice for welding small parts. However, from the viewpoint of quality it is advantageous to have the robot control calibrate and check welding parameters. When welding robots are used, requirements of accuracy of size and the universality of the welding devices become more demanding.

At present the IKARUSZ Body and Vehicle Factory wishes to test the flexible automation of surface-treating processes in three areas with the aid of industrial robots. To do this, it has acquired with the aid of the National Technical Development Committee, a COAT-A-MATIC painting robot. The painting robot is a Swedish product, the RETAB. It has a number 6 degree of freedom and can paint an area the size of the entire rear wall of a bus because of the former's geometric parameters. Like most painting robots it consists of three main units: a manipulator which is entirely explosion-proof, feed units which are located beyond the danger zone, and the control mechanism. Operators

are trained by the teach-in method. This means that the skilled worker doing the painting does it with a handgrip affixed to the head of the robot; the robot then repeats this in the operating mode of the program. The program is stored on a floppy disc. A 15-minute program can be stored on a disc which may consist of a maximum of 75 independent programs. The control has 3 I/O designations one of which indicates the air supply required for painting.

The robot has a maximum speed of 2 m/s. Its testing has begun in the shop where the rear walls of buses are painted. The robot is moved by a moving cart made in Hungary and is successfully completing the given task. Preliminary operations are now underway. Other areas of experimentation include painting of parts on a conveyor belt and the rust-proofing of chassis. Programs suited to the four different models of buses are selected by the operator at present. However, plans call for selection of the type of bus with the aid of a photocell system. The robot will determine the type of bus and activate the appropriate program on this basis. Although Hungarian specialists have recognized the importance of industrial robots in technology in general and in the area machine manufacture in particular, we are definitely lagging when viewed by world standards. This holds true despite the fact that the United Incandescent Factory makes large numbers of industrial robots for the USSR and that the Precision Assembly Factory of Eger has developed its pneumatic robot, the FER-7.5. A sketch of the FER-7.5 appears on page 72.

Despite the unfavorable economic situation of the country, both the upper echelons of our enterprises and the authorities responsible for guiding technical development should pay greater attention to these technological trends.

[See following page for diagram]

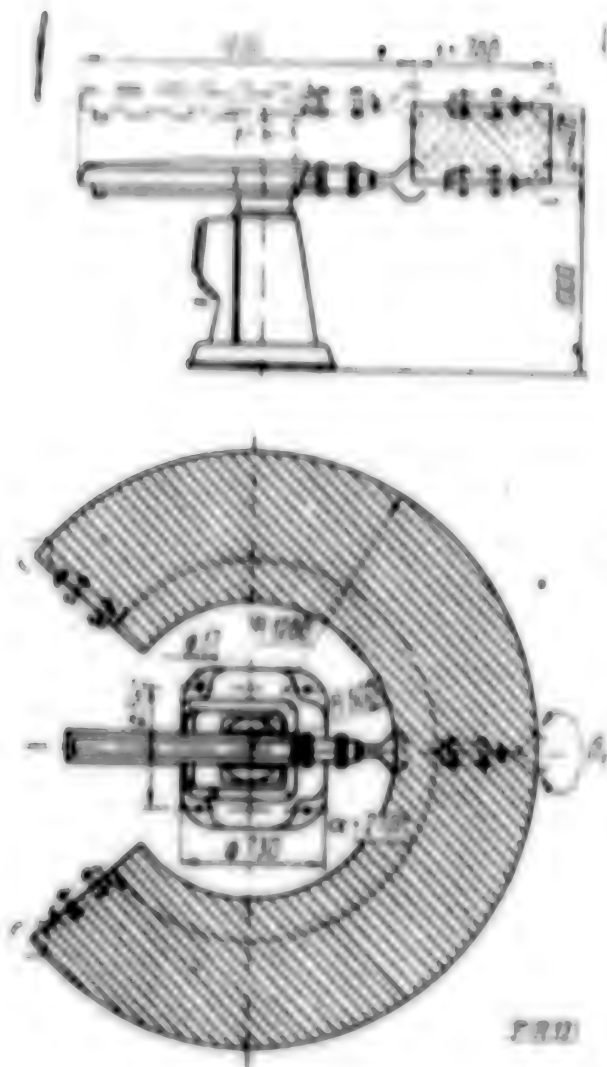


Fig 12: A FER -7.5 Robot

CSO: 2502

USEFUL TO MAKE MORE, NEWER TYPES OF NC MACHINE TOOLS

Budapest IPARGAZDASAG in Hungarian No 3, Mar 80 pp 40-41

[Text] A modern production structure is an especially important factor to an enterprise so decidedly export-oriented as the Machine Tool Factory of the Csépel Iron and Metal Works. Here, nearly 90 percent of the income is derived from export of machine tools which are the main profile of this factory. Transformation of the product structure of the Machine Tool Factory is in harmony with the development concept of the Csépel Works and favors modern, progressive NC and highly accurate machinery which can be sold well on all markets. The specific price per kilogram, inherent profitability, added value and every economic index is considerably more favorable than that of traditional machine tools. The new products will be larger which will enhance their sales prospects because of less competition in this line.

According to the Fifth Five-Year Plan of the enterprise, the ratio of NC and high-precision machines must be increased from 45.5 to 54 percent. The pace of product development has been accelerated through purchase of licenses and broadening of cooperative relations. Plans call for purchase of additional licenses during the Sixth Five-Year Plan.

The investment program has also been put at the service of the transformation of the production structure. A partial technological reconstruction has been planned: shoe type production will be replaced by establishment of organizations and production line systems based on component divisions. One goal is the initiation of machine tool manufacture at the factory unit located at Nyírbátor; this includes implementation of the first phase and modernization of fixed asset stocks.

A further switch in favor of progressive machine tools is expected during the Sixth Five-Year Plan.

Further reduction in the size of series manufactured is expected. There will be more stringent requirements for the degree of automation and precision as well as an increase in progressivity which will call for reduction of machining time.

The size of the series manufactured in the field of NC machine tool production demands that the switchover take place quickly, and this will necessitate simplification of program modification possibilities. CNC drives controlled by microprocessors will come to the fore. Reduction of time spent on cutting, cutting more within a specific time frame, acceleration of cutting speed require that the machines be more rigid and their operation concentrated. Reduced set-up time presupposes full automation of tool and work piece supply. The fields in which this flexible production system can be used are expected to broaden.

The Machine Tool Factory will begin making an entirely new thread-grinding machine of its own design and commence series production of a new line NC lathes.

Manufacture of a new, large drilling-milling machining center will begin during the first half of the plan period as the result of the purchase of licenses. At the same time, plans call for the development of a medium-size drilling-milling processing center line. Design of a new version of an electronically driven helical /"snail"/ gear, grinding machine has begun so that it can be manufactured during the second half of the Sixth Five-Year Plan cycle. In addition to the above-listed new products, there will also be a complete change in the production structure of traditional machine production. By 1985 the ratio of progressive and extremely precise machinery will amount to 65 percent. Production and shipment of complete technological systems will begin.

Modernization of the product mix requires optimal production technology. Quality of raw material and semifinished products will be of prime importance. Therefore, a higher percentage of better quality and more precise globular graphite castings will be used; suppliers will be required to deliver more true-to-size forged, drawn and scraped materials and intermediate products.

Production of specialized, graded parts must be undertaken, and deliveries between plants must be synchronized with storage capacities.

Only computers can take care of organization of production, control and programming efficiently. Therefore, a fully computer-guided and controlled system will be implemented and used during the Sixth Five-Year Plan.

Putting a stop to continuous changes will also promote the organization of production. Documentation of existing types must be finalized and where changes are essential, they must be made in a systematic manner which will not disrupt production. An urgent problem is to make components for competitive products, components which have to be bought, available in the shortest possible time. Successful completion of important business deals may depend on prompt delivery of special electric and hydraulic components, motors, transformers and guidance equipment of export quality.

FIXING SPLIT-SKIN STAMP TRANSPLANTS WITH HISTOACRYL-N-BLUE ADHESIVE UNDER TROPICAL CONDITIONS

Budapest HONVEDORVOS in Hungarian vol 31, Jan-Jun 79, pp 99-102

LUKACS, Gyorgy, Dr., physician-major, TAKACS, Mihaly, Dr., physician-major and SZKLENARIK, Gyorgy, Dr., po.

[Abstract] The use of Histoacryl-N-blue adhesive to fix skin grafts is reported. Due to a crushing injury and subsequent necrosis, the patient had no skin from the middle of his upper to the middle of his lower arm, only an oozing granulation tissue. Because of the tropical conditions, no bandage could be left for more than two days even on steril surgical wounds. The cited adhesive was applied in tiny bits and only to the center of the grafts to permit diffusion. Over a paraffin-impregnated layer, the skin was covered with a few layers of gauze. Epithelization was complete in 3 weeks. Use of the adhesive in cases of free transplants is recommended only when a stabilizing pressure bandage cannot be used for safety. Figures 2; references 21: 6 Russian, 7 Hungarian, 8 Western

2473

CSO: 2502

SIGNIFICANCE OF HIGH PRESSURE OXYGEN BREATHING (TOLT) IN FUNCTIONAL DIAGNOSES OF THE CARDIORESPIRATORY SYSTEM

Budapest HONVEDORVOS in Hungarian vol 31, Jan-Jun 79 pp 29-41

RIGES, Peter, Dr., physician-major; HIDEG, Janos, Dr., physician-colonel; GYOKOSSY, Jozsef, Dr., physician-colonel and GELENCSEI, Ferenc, Dr., physician-lieutenant colonel

[Abstract] Using the TOLT test [subjection to excess pressure of oxygen], the cardiorespiratory system of 31 fighter pilots, over 40 years old, was examined with a Soviet-made cardiorespiratory testing machine. The pressures applied were 150, 250 and 300 mm water for 2, 5 and 10 minutes, respectively. EKG, blood pressure, pulse, respiratory rate and volume, and vital capacity were monitored. Tolerance was good in 7, diminished in 16 and poor in 8 cases. The standards of tolerance evaluation are defined. The pathomechanism of increased intrapulmonary pressure is discussed. This includes an increased amplitude and frequency of impulses from the muscles used for exhalation, already evidenced during inhalation, indicating active reflex-inhibition of inhalation. The effects of high pressure breathing on hemodynamics and the EKG findings are described in detail. Use of the test is recommended for the detection of latent cardiorespiratory insufficiency which is of special importance in middle-age pilots. Figures 16; references 28: 7 Western, 21 Russian

2473

CSO: 2502

POSSIBILITY OF TREATMENT OF MASS INJURIES IN OUR HOSPITAL

Budapest HONVIEDORVOS in Hungarian vol 31, Jan-Jun 79 pp 5-17

ZABORSZKY, Zoltan, Dr., physician-lieutenant colonel, candidate of medical sciences, FRAKNOI, Peter, Dr., candidate of medical sciences and FARKAS, Jozsef, Dr., physician-lieutenant colonel

[Abstract] At the Traumatology Section of the Hungarian People's Army Central Hospital (MNKK), an average of 28 injured are admitted daily. This number greatly increased during a 4-month period in 1978. Based on the experiences during that period, the article deals with 1) the evaluation of current organization and treatment practices, 2) the analysis of methods applicable to large masses of trauma patients both in peace and in war, 3) the search for factors which make difficult the treatment of mass traumatic injuries and their solution, and 4) the organization and treatment of a possible mass arrival of trauma patients at the hospital. In the traumatology section, physical examination, X-rays, anamnesis and administrative duties are completed by specialists while the patients are going through the admission block. When the traumatology section is overloaded because of mass accidents, some patients are transferred to other sections of the hospital. The intensive care unit was especially hampered by overload. Its increased personnel need was covered by regrouping within the hospital and transfer of personnel from the Institute of Traumatology. Supply of lines, food, drugs--especially infusions--was difficult and required close cooperation among the transfusion stations and other supply services. Additional anesthesiologists, neurosurgeons and internists are needed in the case of mass injuries. Recommendations are made for the planning of cooperation among hospitals, enlarged facilities and more equipment, distribution of the patients, documentation, information of relatives, and the supply of power, water and oxygen. These require the setting up of emergency regulations. References 14: Hungarian

2473

CSO: 2502

PROGNOSTIC INDEX IN THE EVENT OF MASS BURNS

Budapest HONVEDORVOS in Hungarian vol 31, Jan-Jun 79 pp 67-79

NOVAK, Janos, Dr., physician-lieutenant colonel, candidate of medical sciences, SZABOLCSI, Ferenc, Dr., MERKEL, Dagmar, Dr., and TICHY Giza (Mrs), National Planning Office, Computer Technology Center; May 1 Clothing Factory, Computer Technology Center

[Abstract] Using their own experiences and literature data, an attempt is made to predict the severity of injuries and the probability of survival in hospitalized mass burn patients. The mortality ratio in cases of mass burns, calculated on the basis of the order of magnitude of the number of victims involved (<10, <100, >100) is presented. The victims of mass burns are classified according to the degree of their burns. This shows a rather well predictable distribution which is of importance in planning for the care of the victims. The ratio of deaths in terms of degree of burns is calculated and is also charted in terms of the probability of death as a function of the percentage of area burned and the age of the individual victims. The probabilities calculated are in agreement with data from an earlier probit analysis involving individual cases of burns from ignited clothing. It is stressed that additional circumstances (absence of a chance to flee from the accident, long distance from a well-equipped hospital, lack of rescue organizations, etc) will diminish the validity of the prognostic index. Figures 2; references 25: 1 Russian, 10 Hungarian, 14 Western

2473

CSO: 2502

UDC: 681.332.3:521.3.018.7.001.4:681.3.087.92

DEVICES FROM THE EMG [ELECTRONIC MEASURING INSTRUMENTS PLANT] FOR THE EVALUATION OF ANALOG SIGNALS BY DIGITAL TECHNIQUES

Budapest MERES ES AUTOMATIKA in Hungarian vol 28 No 2, 1980 pp 41-45

BODY, ISTVAN, and MOHOS, ZOLTAN, EMG

[Abstract] Digitalized analog signals are subjected to mathematical operations in signal-shape examining and -analyzing instruments developed at the EMG. A great variety of hardware configurations can be assembled, depending on the properties of the signal examined, the number of simultaneously examined signals, and the mathematical operations involved. Examples: Type 5500/1 (signal-shape analyzer) (assembled from the devices 55100, 55110, and 55140); Type 5500/2 (transient-signal shape analyzer) (55100, 55110, and 55141); Type 5500/3 (sampling digital-storage oscilloscope) (55100, 55140, and 5121); Type 5500/4 (digital-storage oscilloscope) (55100, 55141, and 1521); Type 5500/5 (universal signal-shape analyzer) (55100, 55110, 55140 and 666); Type 5500/6 (universal signal-shape analyzer) (55100, 55141, 1521, and 666); and Type 5500/7 (universal signal-shape analyzer) (55100, 55110, 55141, and 666). The 55100 signal-shape store, capable of storing up to 4,096 eight-bit words, is included in all combinations. Monitors (1521 and 55110), X-Y recorders (79812), printers (14892), processor (55100), arithmetic units (with EMG 666 or IEC 488 interface), transient digitalizer (55141), or sampling digitalizer (55140) are additional component devices. Some possible applications: mechanical vibrations, acoustic and noise-engineering studies, geophysical and seismic phenomena, high-voltage switching technology, high-speed chemical processes and explosions, high-speed pulse technology, dynamic transfer characteristics of active and passive quadrupoles, and others. Figures 7.

2542

CSO: 2502

UDC: 621.382.2.08:681.2-52

CONSTRUCTION OF HIGH-SPEED MEASURING TERMINAL FOR AUTOMATED DYNAMIC MEASURING SYSTEMS

Budapest MERES ES AUTOMATIKA in Hungarian vol 28 No 2, 1980 pp 53-56

BODY, ISTVAN; MONOS, JANOS; and VERTESI, JENO, EMG [Electronic Measuring Instruments Plant]

[Abstract] The EMG developed high-speed measuring terminal for its 5550/3 system used to examine the dynamic parameters of standard and LS-TTL integrated circuits of the SSI-MSI degrees of complexity. The 5550/1 system, differing only in the design of the measuring terminal, is used to examine TTL-type Schottky integrated circuits of the SSI degree of complexity. The terminals have satisfactory high-frequency characteristics (they have short leads and separate output stages for each connection) and are programmable. They are equipped with interfaces to EMG Type 71666 programmable calculators and IEC bus units. The following modes of operation are feasible: (1) Continuous, for series measurements on large number of circuits (GO-NO GO discrimination); (2) Single, for development purposes, with numerical and oscilloscopic evaluation; and (3) Fail, stopping or repeating as soon as the first faulty value is obtained. Test cards must be prepared for each circuit being examined. A dynamic system is under development, as are additional models for other (LS-TTL, CMOS, ECL, and so forth) and/or more complex (such as MSI, LSI) digital integrated circuits. Figures 5.

2542

CSO: 2502

UDC: 681.33.087.92:519.243

THE EMG-55140 SAMPLING DIGITALIZER

Budapest MERES ES AUTOMATIKA in Hungarian vol 28 No 2, 1980 pp 57-60

MARKO, MIHALY and MEZIE, GEZA, EMG [Electronic Measuring Instruments Plant]

[Abstract] A sampling digitalizer was developed at the EMG for the digitalization of recurring dc and ac (up to 1 GHz bandwidth) signals. Satisfactory images are obtained if the amplitude and temporal resolution are identical; within the frequency spectrum concerned, this amounts to a defined frequency limit of less than 10 kHz. Equivalent-time sampling was utilized to achieve this. The result is a combination of equivalent-time digitalization and amplitude digitalization, with the signals stored in a digital memory. The signal shapes, as well as the parameters of signal recording, are available in digital form; they may be interrogated and set with the aid of a program. Under these conditions, a digital storage oscilloscope--bus-connected to the processor unit--is used to provide the relevant information. Specifications of the EMG-55140 sampler and digitalizer: Runup time--less than 350 psec (10-90 percent); input impedance--50 ohms; amplitude resolution--8 bits 4, 2, 1, 0.4, 0.2, 0.1 mV with LSB; offset voltage--up to +990 mV, 10 mV with LSB; temporal resolution--between 10 psec and 1 nsec in decade steps, with 1, 2, 4 multiplier within the decades; delay time--1 nsec - 999.9 microsec, 1 nsec and 0.1 microsec with LSB; starting modes: internal and external signal source, start and decay slope. Figures 3.

2542

CSO: 2502

UDC: 519.85:681.327.6:681.32

MICROS 8080 PROGRAM-DEVELOPING SYSTEM FOR THE 8080 MICROPROCESSOR WITH AN EMC-666 PROGRAMMABLE COMPUTER

Budapest MERES ES AUTOMATIKA in Hungarian vol 28 No 2, 1980 pp 70-74

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[Abstract] The major advantage of the program-developing system is that the programmer need not know the microprocessor command code but may use an easy-to-remember mnemonic code. A relocatable subject code appears at the output of the assembler (translating program) to create the completed, translated programs easily and without change. The relocating program prepares runnable programs from this relocatable program. The background processor is an EMC-666; the background memory is a MOM [Hungarian Optical Works] floppy disk. A DARD matrix printer, reader, pucher, RAM/ROM periphery, and other devices constitute the hardware. The approximately 32 kbyte software is on floppies and consists of a monitor and file handler, and system components (entered into the memory via monitor commands). The file handler performs the OPEN, CLOSE, WRITE, READ, KILL, RESTORE, and LIST functions; the commands available to the monitor are DATE, EDIT, COMP, RELO, SAVE, BACK, LOAD, COPY, KILL, PACK, PROM, and LIST. Commands monitoring the 8080 programs and assisting them by code are: DUMP, MODY, and TRAP. This MICROS minioperating system has its own two-step symbolic translation program (a 8080 cross-assembler) to facilitate the work of development engineers in the field of Type 8080 microprocessors. Translation and list preparation resulting in a 1 kbyte subject program takes approximately 12-15 minutes. Program preparation, testing, and debugging are considerably facilitated. Figures 3.

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SURVEY OF RESEARCH, DEVELOPMENT IN PRODUCTION

Belgrade EKONOMSKA POLITIKA in Serbo-Croatian 10 Mar 80 pp 19-21

[Text] Debates have revived in recent months concerning the role and influence of research work on economic development; dominant in them is the criticism of scientific research organizations because of the modest benefits of "science" (more precisely--of R&D), while a more comprehensive examination of a development policy which supposedly would alter the unsatisfactory situation comes second or third.

One of the reasons why there is still not enough real debate is certainly the almost total scantiness of reliable data. For example, one can see from the statistics how many researchers have pooled their labor in independent institutes, R&D units and at universities, but not how much each of them works on research at home and how much for others, at another job or on a free-lance basis. This would require special studies and analyses which no one is conducting. Or, when it comes to total investments in R&D, one can see from the statistics who had how much income from those resources, but not who appropriated how much. That is why it is almost impossible to establish, say, what the share of appropriations for these purposes is in the national economy. These are merely examples of the incompleteness and low level of information of the elementary indicators, yet it is still more difficult to arrive at data that would allow one a more detailed and vivid insight.

At one meeting in the Yugoslav Economic Chamber held in January to come closer to an answer as to how to improve inclusion of research in development plans over the next 5 years, representatives of the economy and "science" were agreed in taking note of all that is lacking for a clear answer to be obtained. It was stated at that time that we do not have a fully developed forecasting institution which might describe with high reliabil-

ity future trends in the world economy and state the situation in which the domestic economy will find itself. Nor is anyone drawing up complete and elaborate balances of raw materials potential and other resources. It was also stated that we still have not mastered the technology of setting up research projects, so that often development agreements are arrived at on the basis of insubstantial projects. The question of the objectivity of development studies has also been frequently raised. There was discussion as well of the need for more serious "training" of business-management and self-management bodies so that they adopt decisions on the basis of sound projects which have been worked out fully.

Funds Per Researcher (in thousands of dinars)



Scientific research is still not evident enough in the adoption of development programs, just as the development of research and other business-improvement functions is neglected in planning. A representative of the Jozef Stefan Institute in Ljubljana has described what happened when researchers of the institute tried to bring their programs into conformity with the development plans of economic organizations for the current 5-year

period. Of the 42 medium-term plans which were obtained, the role of research work was mentioned in only 11, and in only 4 did they find indicators they could use in programming their own work. This is one of the principal reasons, feels Boris Frlen, why Jozef Stefan spreads its potential over 220 projects under contracts with the same number of clients, the total value of this research amounting to 120 million dinars.

Piecemeal Research

The fragmentary nature of research work is also evident for the most recent statistical data. In 1978 independent institutes realized about 700,000 dinars on the average project, while R&D units within the economy realized about 490,000 dinars. Slightly fewer research projects were done that year than the total number of persons employed with the title of researcher in independent institutes. The previous year, however, there were more projects than researchers. A comparison of 1977 with 1965 shows that the annual production of research projects is increasing in numerical terms, which means that the projects themselves are becoming smaller.

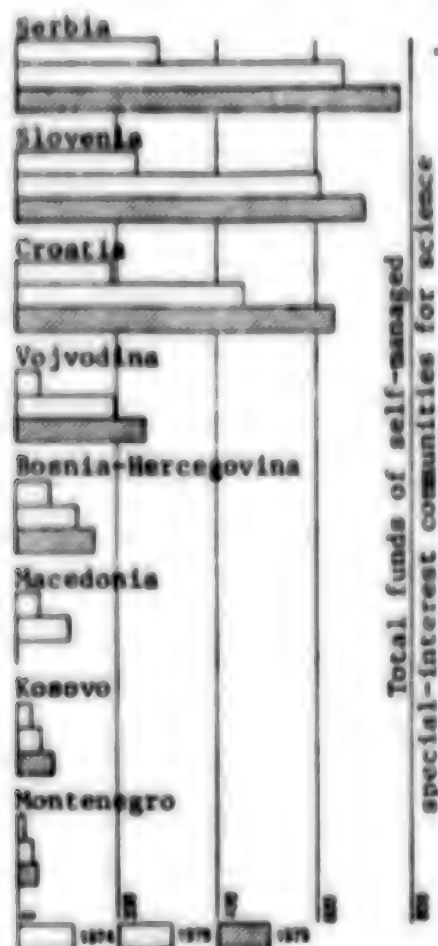
If the income from research is divided by the number of researchers, it turns out that scientific institutes are earning 572,000 dinars per researcher, while R&D units have earnings of 263,000 dinars. However, we should bear in mind that this source of income is dominant in the gross income of R&D organizations and units. Out of their gross income they meet all their expenses, fulfill their legal and contractual obligations, pay wages and salaries and outlays for community consumption, and provide funds to maintain and purchase equipment. The funds actually available per researcher are considerably smaller (as can indeed be seen from the graph).

Staff scientists at Vinca stated last fall in a survey of income earned in organizations providing public services that they earned 65 percent of their income through contracts concluded directly with users. They also said that most of the contracts with OOUR's (basic organization of associated labor) in the sector of material production were purchase-sales contracts, small-sized (involving one or two researchers on projects worth between 1 and 2 million dinars), highly diverse and short-term. The Boris Kidric Institute in Vinca is certainly no exception. One other large Belgrade institute which has developed very intensive collaboration with economic organizations is now working on nearly 300 research assignments under contract, only 20 of which can be said to be of any great size and duration.

When OECD specialists visited our country 7 years ago preparing material for a study of scientific policy in Yugoslavia, they noted in their report that our outlays for research per researcher are only about one-third of the customary outlays for that purpose in the industrialized countries. It is worth remembering the remarks they made on that occasion. "In Yugoslav research the portion of the budget assigned to salaries appears to be considerably larger than in other countries, and there is doubt, pointed up for us by that fact, with respect to the adequacy of the funds available

for laboratory equipment, special instruments and pilot programs. This is a very significant matter if Yugoslav research hopes to provide its own foundation for science and technology at a high level and of a quality capable of being competitive on the international scene."

Total Funds of Republic and Provincial Self-Managed Special-Interest Communities for Science in the 1974-1980 Period



Investments and Return

Viewed as a whole, there is no question that investments in research work in Yugoslavia still do not attain the outlays for that purpose in the most advanced countries. This is also shown by a table prepared from data presented at the Second UNESCO Conference on Scientific and Technological Policy (MINESPOL II), which was held the autumn before last in Belgrade.

Our country began to move through industrialization, and in the present phase of economic development technical progress ought to be given a more significant place among other factors in development. Larger overall investments in R&D are one of the conditions for that.

Country	Number of Researchers (per 10,000 inhabitants)		Investments in Research			
			(dollars per capita)		(% of social product)	
	1967	1975	1967	1975	1967	1975
West Germany	10.8	16.1	40	242	--	1.82
France	10.2	12.6	48	115	2.17	0.97
United States	--	24.7	--	174	--	2.20
Switzerland	--	24.7	--	175	--	2.60
Sweden	8.3	18.3	41	158	1.37	1.70
Norway	9.3	14.8	24	97	1.07	1.37
Finland	4.5	14.3	13	55	0.65	0.97
Spain	1.1	2.5	2	77	0.22	3.36
Greece	1.4	2.8	1	6	0.17	3.60
Hungary	10.2	21.5	9	63	1.43	3.40
Yugoslavia	5.9	8.8	3	14	0.74	1.03

As for total investments, we should bear in mind that there are no reliable data. Figures on income from research can serve only as an auxiliary indicator, since they show an unrealistically high share in the social product and the national income. It is especially difficult to make comparison with the data of international statistics because of differences in the methodology for computing these categories. The only thing that can be shown a bit more definitely is that portion of investments in scientific research realized through self-managed special-interest communities for science.

Last year the SIZ's [self-managed special-interest community] for science in the republics and provinces had a total of 2,782 million dinars. It is significant that the distribution of these funds is very uneven. The economically underdeveloped republics (Bosnia-Herzegovina, Macedonia, Montenegro) and SAP [Socialist Autonomous Province] Kosovo had a total of 404 million dinars, which is only 14.4 percent of the funds set aside throughout the country for research work through contributions. For the sake of comparison, Slovenia set aside 705 million dinars in that way, which is 57 percent more than all the underdeveloped republics and provinces together.

Total appropriations for scientific research work are estimated at slightly higher than 1 percent of the national income; moreover, the funds set aside and invested in Slovenia and Serbia proper are appreciably above the average. The funds pooled through SIZ's for science have a share of 0.28 percent in the national income when we take the average for the entire country. In the less developed parts of the country these funds as a rule represent a smaller portion of investments originating in the economy and other sources than in the more advanced parts. All in all the efforts of society to invest in R&D are yielding smaller benefits precisely in the less developed regions.

There is no doubt that it is very difficult to measure the benefits of investments and of research work itself. Especially when we bear in mind that our methods and techniques are disproportionately less developed than in the industrially advanced countries. The number of research papers published in specialized and scientific publications is often cited and even stressed with a certain pride. In that connection Dr Zlatko Bobatic of the Rado Koncar Institute says that the writing of papers is not enough. The true indicator of the results of scientific research is application of knowledge in a domestic product. Specialists from industry are not even in a position to communicate at meetings and in specialized publication everything they have arrived at during research oriented toward creating a new product or toward improving a process.

One indicator of technical progress, once again not fully indicative as to the benefits of research, is innovative capability expressed in the number of patents applied for. Over the last decade the number of innovations on which patents have been applied for has been increasing, but total innovativeness is still not satisfactory. The figures are given in the table below:

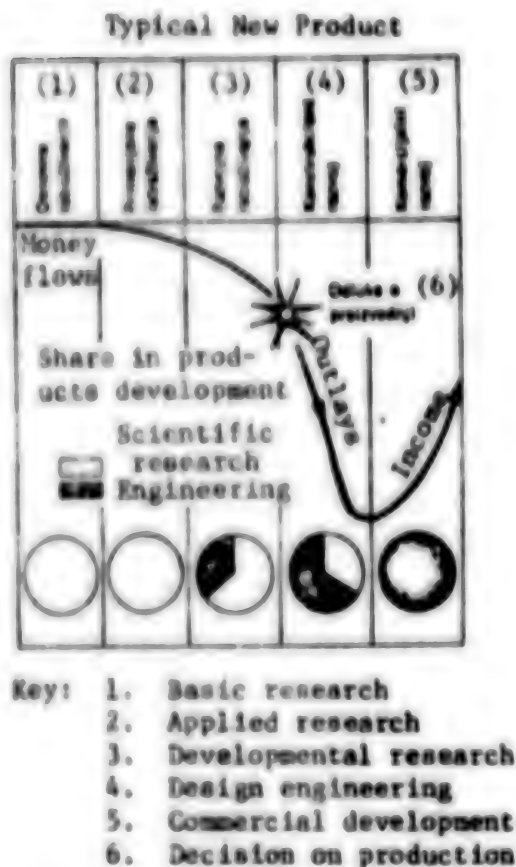
	<u>1970</u>	<u>1973</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
Individuals	708	767	1,063	1,132	987	1,003	938
Organizations of associated labor	140	124	132	162	175	129	191
Institutes	35	37	56	45	31	34	40
Total	883	928	1,251	1,339	1,093	1,166	1,189

When we bear in mind that on the average one innovation in five on which a patent is applied for is registered or protected by a patent, the picture is still less favorable. Another unfavorable circumstance is that work organizations and institutes are filing only one patent application in five. Given the increasingly well-organized R&D effort in the world and expansion of engineering and technological progress, the prospects are poor for individuals to be able to create any sizable technological advance. A comparison with the advanced industrial countries reveals that in the number of patents per 10,000 inhabitants (Yugoslavia--0.2) we lag behind by a factor of 30. Probably all this is affected by the orientation of our R&D potential primarily toward basic and applied research and to a lesser extent toward development of improved technology, processes and products. It is well known that during his life Edison applied for and obtained patent protection on 1,093 innovations, but he had only one basic discovery--the "Edison effect," which consists of the emission of electrons from a heated electrical conductor.

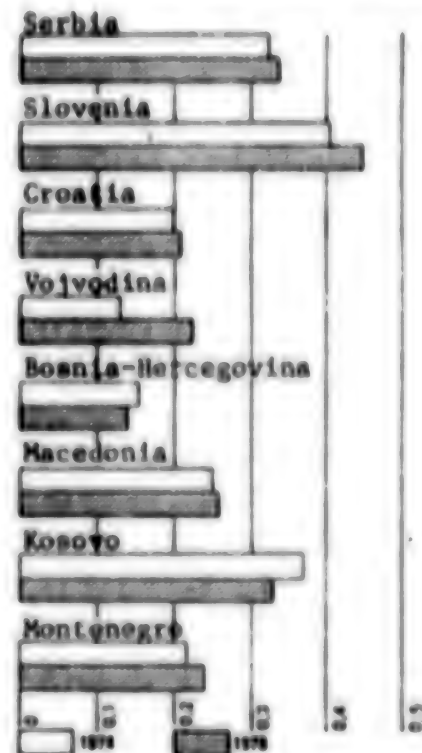
The Costs and Risk of Innovations

Outlays to develop new products and technologies are incomparably greater than outlays for the corresponding basic and applied scientific research. However, there can be no development without basic and applied research.

Development costs embrace large outlays for laboratory experiments, the setting up of pilot plants and test runs, as well as huge outlays to launch a new product and for advance research of the market.



Share of Funds of Republic and Provincial SIZ's for Science in the National Income



The experiences of the American firm Corning Glassworks, which is a large company in the glass industry and has an annual income of \$1.25 billion, can be illustrative. In the 100 years of its history this firm has traditionally led in the investments it made in research and new product development. However, even it has not been able to avoid mistaken investments. The attempt to develop unbreakable glass for car windshields was an expensive failure. The development lasted some 15 years and ended in the early seventies. The new windshield did in fact resist even the hardest blows, but it was very expensive. Detroit automobile manufacturers did not want to buy it and the firm had to write off the \$42 million invested.

In developing their next product they "bet" on Detroit's switching from the gasoline engine to the gas turbine, and they developed a heat exchanger for a gas-driven automobile. The switch did not take place, and this project was also thrown into the wastebasket after \$15 million were spent. However, the effort was not altogether in vain. The heat exchanger required development of porous ceramics with high thermal resistance, exactly what was

needed as a catalyst to eliminate exhaust gases. Corning spent \$50 million to develop the catalyst before the air pollution act was passed, at a time when Detroit was still lobbying against that law. The risk paid off, the law passed, and Corning got back not only the investments in development of the catalyst, but also the money it invested to develop the heat exchanger.

The costs of innovations and new product development go to astronomical levels. Since development lasts some 10 years or more, it eats up enormous amounts and carries a very high risk even when very detailed studies of the market and good forecasts are made; only the largest corporations can allow themselves to experiment over a broad range of products. The smaller ones must be cautious and must concentrate on particular sectors, along with wise adoption of technologies already mastered, adaptation and improvement of products, and with the best possible ratio of costs to quality. In a certain sense one might learn from Sweden's orientation toward only a few industries. Like the United States, Great Britain and certain other advanced countries of the West, Sweden has for years been confronted with declining productivity, for one thing because of the high earnings of workers and their high absentee rate (as high as 20 percent in many companies). A way out is sought by making larger investments and obtaining larger benefits from research work. However, since Sweden is a relatively small country, it is unable to set aside as much money for research as the larger economies. Last year total investments ran about \$1.5 billion, which corresponds to the investments of a General Electric, a Siemens or an IBM. This has compelled Swedish industry to concentrate on certain specific markets. Some of these market segments are not in fact spectacular--Sweden has 90 percent of the world market of equipment for continuous wood pulp digestion and 80 percent of the market for eccentric grinding machines for sharpening rods--but the earnings here are good. One favorable circumstance for Sweden is that in, say, the metal complex, it has oriented more toward processing equipment than toward finished consumer goods. Inflation all over the world has forced enterprises to save money on the launching of new products and to spend more to adopt new processes allowing them to produce more cheaply.

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